OPERABLE UNIT TWO (OU2)
REMEDIAL INVESTIGATION /FEASIBILITY STUDY (RI/FS)
WORK PLAN

SOUTH DAYTON DUMP AND LANDFILL
MORAINE, OHIO

SEPTEMBER 2013
REF. NO. 038443 (19)
This report is printed on recycled paper.

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1.0 INTRODUCTION

This document is the Operable Unit Two (OU2) Remedial Investigation / Feasibility Study (RI/FS) Work Plan for the South Dayton Dump and Landfill Site (Site). The purpose of this document is to present a summary of available information and identify data needed to further characterize OU2 conditions for the OU2 RI. Conestoga-Rovers & Associates (CRA) has prepared this OU2 RI/FS Work Plan on behalf of the Respondents to the Administrative Settlement Agreement and Order on Consent (ASAOC) for Remedial Investigation/Feasibility Study (RI/FS) of the Site, Docket No. V-W-06-C-852 (Respondents).

The Respondents include Hobart Corporation (Hobart), Kelsey-Hayes Company (Kelsey-Hayes), and NCR Corporation (NCR). These three Respondents are and have been performing the Work required by the ASAOC under the direction and oversight of the United States Environmental Protection Agency (USEPA).

1.1 SITE LOCATION AND BACKGROUND

The Site is located at 1901 through 2153 Dryden Road (sometimes called Springboro Pike) and 2225 East River Road in Moraine, Ohio. The approximately 80-acre Site is a former disposal site and includes areas where municipal, industrial, and residual waste, and construction and demolition debris were disposed. The Site location is shown on Figure 1.1.

The Site is bounded to the north and west by the Miami Conservancy District (MCD) floodway[1] (part of which is included in the definition of the Site), the Great Miami River (GMR) Recreational Trail and the GMR beyond. The Site is bounded to the east by Dryden Road with light industrial facilities beyond, to the southeast by residential and commercial properties along East River Road with a residential trailer park beyond, and to the south by undeveloped land with industrial facilities beyond.

The Site has been defined in the Statement of Work (SOW) as an area of approximately 80 acres, including the Valley Asphalt plant in the northernmost portion of the Site

1 The MCD defines a floodway as the channel of a river or watercourse and the adjacent land areas that have been reserved in order to pass a specified flood discharge. The floodway is usually characterized by any of the following: moderate to high velocity flood water, high potential for debris and projectile impacts, and moderate to high erosion forces. The MCD floodway is not the same as the 100-year floodway and 100-year floodplain areas at the Site based on FEMA flood insurance maps, which are more extensive than the MCD definition.

(Parcel 5054), an auto salvage yard in the southeast (Parcels 3753 and 4423) and a gravel pit/quarry pond (the Quarry Pond, Parcels 3274 and 5178) in the southern part of the Site. The central 40 acres (described as 23 acres in some documents) of the Site was referred to as the South Dayton Dump and Landfill in some reports. More recent information including an undated tax map in the Montgomery County Health Department (MCHD) files, soil boring logs, drums found at Valley Asphalt, USEPA's aerial photograph analysis, underground storage tank (UST) closure reports, the deposition of Horace (Jack) Boesch Jr., and investigations completed as part of the OU1 RI indicate that landfilling and other waste disposal and handling activities occurred across much of the Site and that the Site extends partially onto the adjacent MCD-owned floodway to the west of the Site.

1.1.1 OWNERSHIP

Cyril Grillot and Horace Boesch acquired interests in portions of the approximately 40-acre central portion of the Site starting in 1936. The properties to the north (currently Valley Asphalt) and the vacant land and Quarry Pond to the south were also owned by Grillot and Boesch. Horace Boesch purchased the land to the north in 1945, (a half interest was subsequently transferred to Cyril Grillot in 1951) and sold it to Valley Asphalt in 1993.

The SOW identifies the following 14 Parcels from the Montgomery County Tax Rolls as part of the Site: 5054, 5171, 5172, 5173, 5174, 5175, 5176, 5177, 5178, 3274, 3753, 4423, 4610, and 3252. Subsequent investigations identified waste and Site-related fill material on adjacent Parcels 3056, 3057, 3058, 3275, and 3278. In correspondence from USEPA (March 15, 2010) and the Respondents (April 1, 2010), these Parcels were added to the definition of the Site.

Seven Parcels are jointly owned by Katherine A. Boesch, widow of Horace J. Boesch, and Margaret C. Grillot, widow of Cyril J. Grillot. Horace J. Boesch and Cyril J. Grillot had jointly owned the seven Parcels (5171, 5172, 5173, 5174, 5175, 5176, and 5177) since at least 1952 and had acquired them in a series of transactions between 1936 and 1952. Parcels 5171 and 5054 were part of two tracts acquired by Horace J. Boesch or Cyril J. Grillot in 1936 and 1952, respectively. Parcel 5171 is part of the Grillot and Boesch Plat and is currently jointly owned by Katherine A. Boesch and Margaret C. Grillot. Parcel 5054 was acquired by Valley Asphalt in 1993; however, lease records suggest that Valley Asphalt's association with the Parcel began in 1956.

The south and southeastern parts of the Site comprise five Parcels 3274, 3753, 4423, 4610, and 3252. Horace J. Boesch or Cyril J. Grillot at one time owned these Parcels. Parcel 3274 is currently owned by the MCD and was acquired from the University of Dayton in 1969. Horace J. Boesch and Cyril J. Grillot gave the property to the University of Dayton in 1968. Boesch and Grillot had held the Parcel since acquiring a 30-acre tract from John Albert Davis in 1945.

The 30-acres also included Parcels 3753, 4423, and 4610. Parcel 3753 was conveyed to Doyle Roberson and Virginia Roberson in 1975, who then conveyed the Parcel to Ollie Lacy in 1988. Following the distribution of property after the death of Horace Boesch, Cyril Grillot and the Boesch heirs conveyed Parcels 4423 and 3252 to Ollie and Judith Lacy in two transactions in 1981. Following the death of Judith Lacey in 1987, Ollie Lacy acquired sole ownership of these Parcels. In 1989, Ollie Lacy conveyed Parcel 4610 to the current owner, Ronald Barnett. Attached to the deed was a legal description of Parcel 4610 that implied that it was originally part of Parcel4423.

Following Ollie Lacy's death in 1990, his heir conveyed Parcels 3252, 3753, and 4423 to Sharon Roe, who then conveyed Parcel 3252 to Ronald Barnett in 1992 and Parcels 3753 and 4423 to South Dayton Salvage, Inc in 1996. Ronald Barnett is the owner of Parcels 3252 and 4610. South Dayton Salvage, Inc. conveyed both Parcels 4423 and 3753 to Jim City Salvage, Inc. after 1999. The current owner of Jim City Salvage is Jim Worley. Williem Zachar, the previous owner of South Dayton Salvage, signed the Land Installment Agreement for Parcel 3753 in 1978.

The MCD owns Parcels 3056, 3057, 3058, 3207, 3274, 3275, and 3278. MCD acquired Parcel 3056 prior to 1937 and there was no evidence that any member of either the Grillot or the Boesch families ever owned it. While there are some location discrepancies in the records with respect to Parcels 3057 and 3058, ownership by Horace J. Boesch (Parcel 3057) and Cyril J. Grillot (Parcel 3058) is limited to 1 or 2 years in the mid-1930s. Parcel 3275 was acquired by MCD in 1938 and Parcel 3207 was acquired by Walloon Holdings, LLC, from the heirs of John Albert Davis.

1.2 OPERABLE UNITS

In a letter dated January 9, 2008, USEPA proposed that the Site be divided into two operable units, OU1 and OU2. OU1 comprises the "landfill source area of the Site" and OU2 comprises "off-Site areas not addressed by the presumptive remedy". USEPA proposed that the Respondents complete a Streamlined RI/FS report for OU1 and a conventional RI/FS report for OU2.

1.2.1 OPERABLE UNITS LIMITS

OU1 includes the following parcels:

- Parcel 5054 (Valley Asphalt)
- Parcels 5171, 5172, 5173, 5174, 5175, 5176 (Boesch and Grillot)
- Parcel 5177 including road easement but excluding water and submerged portions of the Quarry Pond (Boesch and Grillot)
- Part of Parcels 3278, 3058, 3057, and 3056 including embankments (owned by the MCD) onto which waste extends
- Part of Parcel 5178 containing north Quarry Pond embankment (Boesch and Grillot)
- The unnumbered parcel at the Site entrance

OU1 includes the following areas or media:

- Landfill material, surface and subsurface soil and hot spots
- Leachate
- Landfill gas (LFG) and soil vapor
- Surface water and sediment
- Air

The Site limits of OU2 are approximated on Figure 1.2. OU2 includes the following areas or media, which are not part of OU1:

Deleted: depicted

- Landfill material, surface and subsurface soil, and hot spots outside OU1 (e.g., the floodplain area between the Site and the GMR [2]) attributable to historic Site operations
- Parcel 3274 and parts of Parcels 5177 and 5178 not addressed in OU1, including submerged portions of the Quarry Pond
- Parcels 3753, 4423, 4610, and 3252, including active businesses along the southeast portion of the Site

2 The MCD defines a floodplain as a strip of relatively flat and normally dry land alongside a stream, river or lake that is covered by water during a flood. The floodplain area between the Site and the GMR is not the same as the 100-year floodway and 100-year floodplain areas at the Site based on Federal Emergency Management Agency (FEMA) flood insurance maps, which are more extensive than the MCD definition.

- Portions of Parcel 3275, which are owned by MCD, upon which waste has been placed
- Shallow groundwater (i.e., nominally at elevations above 675 feet above mean s ea level [ft AMSL]), within and outside OU1
- Deeper groundwater (i.e., nominally at elevations below 675 ft AMSL), within and outside OU1
- Leachate outside OU1 (e.g., the floodplain area between the Site and the GMR
- Landfill gas (LFG) and soil vapor outside OU1
- Surface water and sediment outside OU1 (e.g., in the Quarry Pond and in the GMR adjacent to and downstream of the Site)
- Air outside OU1

These areas and media , which are not addressed by the Presumptive Remedy, are the Site areas or media in which it is not clear that there is a basis for remedial action and whether a Presumptive Remedy approach is appropriate. Therefore, the Respondents will address these areas and media through a conventional (i.e., not streamlined) RI/FS, human health risk assessment, and ecological risk assessment.

Figure 1.2 depicts the on -Site OU2 Parcels. As discussed by USEPA and the Respondents during a conference call held on May 23, 2013, OU2 includes any area , outside of OU1, where OU1 contamination has come to be located . Thus, OU2 potentially includes any area outside of the OU1 boundary that contains Site-related contamination.

1.3 REPORT OBJECTIVES AND ORGANIZATION

The objective of this document is to provide the basis for determining the field data collection activities that are needed to characte rize OU2 conditions for the OU2 RI. The field data collection procedu res will be detailed in individual OU2 Work Plan s, to be developed following agency review and approval of this RI/FS Work Plan.

This document is organized as follows:

- Section 1.0 provides an introduction, including Site background, a discussion of operable units, report objectives and organization
- Section 2.0 provides information regarding previous investigations, including analytical data and sampling locations, and identified data gaps

- Section 3.0 provides a conceptual site model (CSM)
- Section 4.0 provides the remedial action objectives, remedial technologies, and applicable or relevant and appropriate requirements
- Section 5.0 provides a description of the proposed field data collection activities and data quality objectives
- Section 6.0 provides background comparison procedures
- Section 7.0 provides risk assessment procedures
- Section 8.0 provides references for previous investigations and other documents

2.0 SUMMARY OF OU2 INVESTIGATION RESULTS

This section presents a summary of the investigation results for the OU2 Parcels that are part of the Site. The Quarry Pond, Jim City, and Ron Barnett Parcels are collectively referred to herein as the OU2 Southern Site Parcels. The Quarry Pond Parcels occupy Parcels 3274, portions of Parcel 3275 upon which waste has been placed, and parts of Parcels 5177 and 5178 not addressed in OU1, including submerged portions of the Quarry Pond. Jim City occupies Parcels 3753 and 4423. Ron Barnett occupies Parcels 4610 and 3252. The OU2 Southern Site Parcels are shown on Figure 1.2.

The following also presents a summary of available information related to the history of the OU2 Southern Site Parcels, and a visual description [3] of the nature of the material encountered at OU2 investigative locations. This discussion is based on a review of historic documents, a review of aerial photographs, and several intrusive investigations, including historical investigations, borehole advancement, test pit and test trench excavation, and soil and groundwater sample collection. Data gaps based on the available information are also presented in this section.

2.1 QUARRY POND PARCELS

The investigations and sample collection activities completed by CRA and others in the Quarry Pond Parcels include the following:

- Geophysical investigations (EM31 conductivity, EM61 metal detection, and total field magnetic anomaly surveys). See Figure 2.1 for areas of identified anomalies.
- Test trenches excavated based on the results of the geophysical surveys and other field observations. These are identified as TT-16, TT-16A, TT-17, and TT-18 on Figure 2.1.
- Soil/fill material samples from selected test trenches. The analytical results are summarized in Table 2.1.
- Surface water samples from three locations as shown on Figure 2.2. The analytical results are summarized in Table 2.2.
- Sediment samples from eight locations (during earlier investigations by others) as shown on Figure 2.2. The analytical results are summarized in Table 2.3.

[3] Waste classifications as described in OAC 3745-27, 29, 30, and 400, are based on visual observations. OAC waste classifications do not require analytical characterization.

- Radiation screening of soil/fill (at ground surface). The results are shown on Figure 2.3.
- Vertical Aquifer Samples (VAS) from three locations (VAS-13, VAS-19, and VAS-20) as shown on Figure 2.4. The analytical results are summarized in Table A-1 of Appendix A.
- Groundwater samples from monitoring wells (MW-209, MW-209A, MW-212, MW-218A, and MW-218B) as shown on Figure 2.4. The analytical results are summarized in Table A-2 of Appendix A.
- Soil gas sampling from four (?) locations as shown on Figure 2.2. The analytical results are summarized in Table...

Overview of OU2 Quarry Pond Parcels History and Fill Material Information

Based on the USEPA Aerial Photographic Analysis of South Dayton Dump Site and CRA's analysis of the available aerial photos, the area south of the east-west access road (portions of Parcels 3274 and 5178) was excavated from the 1950s to 1970s for a gravel extraction operation. The northeastern portion of Parcel 5178 appears to have been partially filled in by 1981. There are no data to indicate whether the area of the present Quarry Pond below the water level was filled beyond the material placed in the northeastern portion of the Quarry Pond or beyond the current extent of the northern, eastern, and western embankments of the Quarry Pond.

There are no data to indicate how far the material placed in the northeastern portion of the Quarry Pond extends into the pond or whether the material placed along the embankments extends into the Quarry Pond. CRA did not observe non-native soil material during drilling VAS-20, located in the center of the southern Quarry Pond embankment. However, there are no data to indicate how far the landfill material observed during drilling of VAS-13 at the western corner of the southern Quarry Pond embankment, or TT-18 on Parcel 3753 extends towards VAS-20. CRA observed traces of glass and concrete debris in the top two feet of fill from VAS-13.

There is debris in the Quarry Pond that appears to have either been dumped by third parties or trespassers, after the Site operations ceased, into the pond or washed there during storm events. At the time of CRA's November 17 and 18, 2005 inspections, CRA observed four partially submerged drums that appeared to be empty in the northeastern part of the Quarry Pond. Ohio EPA, Ohio Department of Natural Resources (DNR) and the District Attorney's Office completed a sonar and underwater camera investigation of the Quarry Pond on November 9, 2012. The sonar survey identified tires and 25 to 30 objects of a size and shape that may be indicative of drums; these possible drums

Comment [LJP1]: This sentence seems to suggest that the drums, tires, and unidentified objects discussed later in the paragraph are all due to 3rd party dumping or during storm events. If that is the assertion, provide the basis for this conclusion. If the intention is simply to say that there likely is both site-related and non-site-related debris in the pond, change the statement.

were dispersed throughout the Quarry Pond but were most prevalent at the north edge of the pond, below the east -west access road that transects the Site. The Ohio DNR observed a mound of submerged tires as well as multiple tires along the embankment leading from the Jim City Parcels.

The geophysical survey results for the Quarry Pond floodplain (northeastern portion of Parcel 5178) indicate that anomalous EM61 responses were detected in areas where reinforced concrete was observed at ground surface. CRA observed coincident EM61 and magnetic anomalies in the vicinity of TT -16 and TT-16A. CRA encountered metal rods and rebar in the upper 5 feet of waste at these locations, consistent with EM31 and EM61 readings for these anomalies.

CRA excavated four test trenches (TT-16, TT-16A, and TT-17), installed VAS boreholes at three locations (VAS -13, VAS-19, and VAS -20), and installed three monitoring wells (MW-209A, MW-218A, and MW-218B) on Quarry Pond Parcels 3274 and 5178. Historic investigations included one soil boring, GT-212, and installation of two monitoring wells (MW-209 and MW-212) in this area. At these 12 test trench and soil boring locations in the northeast portion of Parcel 5178, and in the embankment surrounding the Quarry Pond, CRA and previous consultants visually identified mainly fill and residual waste (i.e., foundry sand) as well as construction and demolition debris (e.g., concrete, brick, asphalt, rebar, and roofing shingles). Due to the lack of anomalies, CRA did not excavate trenches or advance any soil borings on Parcel 3275.

Based on field screening, CRA collected three soil samples from two locations on Parcel 5178: TT-16 and TT-17). The concentrations of PAHs and metals in soil samples collected from these two test trench locations were greater than Industrial Soil USEPA Regional Screening Levels (RSLs).

The Quarry Pond itself encompasses approximately 15 acres of the 20-acre Quarry Pond Parcels. CRA has not collected any samples for USEPA Target Compound List (TCL) or Target Analyte List (TAL) analyses from Parcel 3274, and CRA has not completed any installations nor has any analytical data for the subsurface material present on Parcel 3275.

Analytical data for eight sediment samples Ohio EPA and the Payne Firm Inc. (PFI) collected between 1996 and 2000 are available for the Quarry Pond. Ohio EPA collected two sediment samples 15 to 18 feet below the water surface of the Quarry Pond, 150 and 350 feet west of the northeast corner of the Quarry Pond in 1996 (samples S15OEPA and S16OEPA). The concentrations of PAHs and metals in the Ohio EPA sediment samples were greater than Industrial Soil RSLs. PFI collected three sediment samples during each of their 1999 and 2000 sampling events (Sediment -1, Sediment -2, Sediment -3, SED-1, SED-2, and SED-3) for VOC analyses. The depths of the PFI sediment samples are unknown. The concentrations of VOCs in the PFI samples, if detected, were less than Industrial Soil RSLs.

The observed depths of fill and waste beneath the Quarry Pond Parcels range from 0 to 36 feet.

Data Gaps

CRA has identified the following data gaps in the Quarry Pond area:

- Characterization of the fill material (surface and sub-surface) surrounding the Quarry Pond within Parcels 3274, 3275, and 5178
- Further characterization of groundwater conditions below the fill material and along the perimeter of the Quarry Pond Parcels
- Based on data collected from the soil and groundwater investigation, soil gas monitoring within the fill material and along the southern and western perimeters of the Quarry Pond Parcels may be warranted
- Determination of the presence of non-native material at the base of the Quarry Pond
- Characterization of the soil/sediment at the base of the Quarry Pond
- Characterization of surface water quality within the Quarry Pond

2.2 OU2 JIM CITY AND RON BARNETT PARCELS

The investigations and sample collection activities completed by CRA on the Jim City and Ron Barnett Parcels (Parcels 3753, 4423, 4610, and 3252) include the following:

- Geophysical investigations (EM31 conductivity, EM61 metal detection, and total field magnetic anomaly surveys). See Figure 2.1 for areas of identified anomalies.
- Test trenches based on the results of the geophysical surveys and other field observations. These are identified as TT-17 and TT-18 on Figure 2.1.
- Soil/fill material samples from both test trenches. The analytical results are summarized in Table 2.1.
- Soil gas probes at four locations (GP07-09, GP08-09, GP09-09, and GP10-09) and one location (GP06-09) on adjacent Parcel 3261, as shown on Figure 2.2. The monitoring results are shown on Table 2.4 (VOCs) and Table 2.5 (field parameters).

- Radiation screening of soil/fill (at ground surface). The results are shown on Figure 2.3.
- VAS groundwater samples from one location (VAS-22), as shown on Figure 2.4. The analytical results are summarized in Table A-1 of Appendix A.

Overview of OU2 Jim City and Ron Barnett Parcels History and Fill Material Information

The USEPA Aerial Photograp hic Analysis of South Dayton Dump Site include aerial photographs taken between the 1950s and 2000 that show portions of the area south of the east-west access road and east of the Quarry Pond (portions of Parcels 3753 and 4423 and the western portion of Parcel 4610) were excavated between the 1950s and 1970s. The ground surface in the eastern portions of these parcels appears to have been disturbed during the same time period; however, it is unclear in the aerial photographs, whether the excavation extended across the entirety of these parcels. Based on aerial photographs and Site documents, the eastern p ortion of Parcels 3753, 4423, and 4610, appears to have been re -graded and was filled during the 1970s and 1980s. Filling commenced at the eastern side of Parcel 3753 and progressed westward, resulting in the filling of Parcels 3753 and 4423 to current grades.

Based on information from Ohio EPA records and a review of aerial photographs, Mantle Oil Se rvice, formerly located at 2227 East River Road, operated on Parcel 4610 between 1971 and 1986/7. The aerial photographs indicate build ings were constructed on Parcel 4610 sometime between September 1970 and April 1973. Additional buildings and ASTs are visible in the 1975 aerial photograph.

During the geophysical investigation, CRA detected metal lic anomalies associated with scrap metal and partia lly burie d car parts on Parcels 3753 and 4423 (Jim City Salvage property). The EM61 metal results for Parcels 3753 and 4423 (Jim City Salvage property) indicate that the majority of the responses can likely be attributed to metallic objects , relating the scrap metal operations at or near ground surface.

CRA identified two areas of greater conductivity on the Jim City Salvage property. A summary of the geophysical anomalies is provided on Figure 2.1. CRA did not identify any significant magnetic or EM61 metallic responses in the northernmost elevated EM31 conductivity anomaly on Jim City property Parcel 4423, which indicates the anomalies are likely the result of conductive fill or waste, rather than buried metal objects, such as drums or tanks. CRA encountered r ebar and scrap metal in the upper 5 feet of waste during the excavation of TT -17, which was located 38 feet south of the EM31 anomaly that had a conductivity response of 50 milliSiemens per meter (mS/m). On Parcel 4423, CRA encountered foundry sands during the drilling of VAS-22, which was located within the southern conductive anomaly. The identified material and associated depths are consistent with EM31 and EM61 readings for these anomalies. It is not possible to say whether TT-18 and GP07-09 were located within or outside of conductive anomalies, as Parcel 3753 was not included in the EM31 Electromagnetic Survey because the Parcel could not be surveyed, due to the presence of surface material (e.g., manhole lids, tire rims, mechanical equipment) that could not be moved.

CRA identified two areas of conductive areas on Parcel 4610 (one of the Ron Barnett Construction Parcels). The EM31 conductivity anomalies on Parcel 4610 contained a lack of magnetic or EM61 metal detection responses, which indicates the anomalies may be the result of conductive fill or waste, rather than buried metal objects, such as drums or tanks. CRA encountered dark gray/black sand and silt during the advancement of GP10-09, located within the larger of the two conductive anomalies on Parcel 4610. The identified material and associated depths are consistent with EM31 and EM61 readings for these anomalies.

CRA excavated two test trenches (TT-17 and TT-18), installed one VAS boring (VAS-22), and installed four soil gas probes (GP07-09 to GP10-09) on the Jim City and Ron Barnett Parcels. The soil gas sample collected from GP08-09 contained chloroform at a concentration greater than the residential soil vapor screening level (SVSL). The soil gas samples collected from GP09-09 and GP10-09 contained VOCs (chloroform, naphthalene, tetrachloroethene, and/or trichloroethene) at concentrations greater than residential and/or industrial SVSLs. At these seven locations on the Jim City and Ron Barnett Parcels, CRA encountered residual waste (foundry sand) and construction and demolition debris (concrete, wood, brick, and railroad ties), to depths of 14 feet below ground surface (bgs).

Where present the observed depth of fill beneath the Jim City and Ron Barnett Parcels ranges from greater than 12 feet to greater than 25 feet. The fill on these parcels ranges in thickness from greater than 12 feet to 26 feet.

Data Gaps

CRA has identified the following data gaps in the Jim City and Ron Barnett Parcels:

- Characterization of the fill material (surface and sub-surface) within Parcels 3753, 4423, 4610, and 3252

- Further characterization of groundwater conditions below the fill material and along the eastern perimeter of the Jim City and Ron Barnett Parcels
- Based on the results of the soil and groundwater investigation, the Respondents will complete soil gas monitoring within the fill material and along the eastern perimeter of the Jim City and Ron Barnett Parcels if warranted

Comment [LJP2]: What is the rationale for not proposing further soil gas sampling now? Soil gas data from GP09 indicates elevated soil gas concentrations.

2.3 GREAT MIAMI RIVER AND FLOODPLAIN AREA

Investigations of the floodplain area have involved examining the fill material conditions adjacent to the floodplain, delineated as shown on Figure 2.5. CRA has not identified any evidence of leachate seeps along the embankment of the fill material adjacent to, and nearby areas within the floodplain during Site inspections completed from September 2008 to November 2009.

The investigations and sample collection activities completed by CRA and others for the GMR and floodplain area include the following:

- Two soil samples (S08 and S10) collected from locations along the fill material boundary as shown on Figure 2.5. The analytical results are summarized in Table 2.1. The results indicate that select polycyclic aromatic hydrocarbons, thallium, lead, iron, arsenic and polychlorinated biphenyls were present at concentrations greater than USEPA Residential and/or Industrial RSLs.

Ohio EPA collected three sediment samples (S17, S18, and S19) from the GMR as shown on Figure 2.5. The analytical results are summarized in Table 2.3. The results indicate that select polycyclic aromatic hydrocarbons, thallium, and arsenic exceed USEPA Soil Residential and/or Industrial RSLs. CRA notes that comparison to Soil RSLs is not directly applicable to sediment.

A heavily vegetated man-made embankment, which according to Jack Boesch was constructed of fill materials, including material resembling slag, ash, and foundry-type sands, by the Site owners/operators, is present along the central (Parcel 5177) portion of the Site, and extends past the northern and western boundary of Parcel 5054, along the GMR. Portions of the berm are located on the MCD property. The grassy area between the berm and the GMR is part of the 100-year floodway and is owned by the MCD.

In November 2005, CRA observed slag and metal debris across the western surface of the embankment slope, and discrete piles of wastes consisting mostly of construction and demolition debris with insignificant amounts of municipal -type wastes on the surface at a few locations.

Data Gaps

CRA has identified the following data gaps in the GMR and floodplain area:

- Characterization of the soil conditions adjacent to the fill material boundary and the recreational trail
- Characterization of background soil conditions within the floodplain area
- Characterization of surface water quality and sediment conditions within the GMR adjacent to, and immediately downstream of, the Site
- Characterization of background surface water quality and sediment conditions within the GMR upstream of the Site

2.4 GROUNDWATER

The results of groundwater investigations conducted to date are documented in multiple reports. The analytical data for groundwater at the OU2 Southern Site Parcels are contained in Appendix A.

CRA will complete further investigations to characterize groundwater conditions within the limits of the OU1 and OU2 Parcels (see data gaps noted in Sections 2.1 and 2.2) and, as necessary, beyond the limits of the OU2 Southern Site Parcels. CRA will fully identify and address these groundwater data gaps following completion of the current groundwater investigation, which is outlined in the May 10, 2013 *Final Work Plan for Operable Unit One (OU1) Groundwater and Data Gap Investigation – Phase 1A*, and the September 20, 2013 *Proposed Monitoring Well and Vertical Aquifer Sampling Locations – Phase 1B and 2A*.

Comment [LJP3]: Add references.

Deleted: (see data gaps noted in Sections 2.1 and 2.2)

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3.0 CONCEPTUAL SITE MODEL

The following presents a summary of the preliminary CSM for the Site based on human health exposure and ecological receptors. Appendix B contains the CSM.

In order to evaluate the significance of the impacted media at the Site, the potential pathways by which individuals may come in contact with the media must be determined. The combination of factors (chemical source, media of concern, release mechanisms, and potential receptors) that could produce a complete exposure pathway and lead to human uptake of chemicals at the site is assessed in the CSM.

For purposes of the preliminary CSM, two primary source areas and five potential exposure areas were considered based on current conditions.

The two primary source areas include:

- The landfill contents within the OU1 Parcels, also referred to as the Presumptive Remedy Area
- The landfill contents outside of OU1, within the OU2 Parcels

The five potential exposure areas are referenced as:

- OU1 Parcels
- OU2 Parcels
- Quarry Pond (part of OU2)
- Off-Site properties (part of OU2)
- GMR/floodplain (part of OU2)

As indicated above, the OU1 Parcels and OU2 Parcels represent both source areas and potential exposure areas. Potential receptors may include full-time workers, temporary (e.g., construction) workers, residents, and trespassers.

Other potentially exposed receptors for constituents of concern (COCs) that may migrate from the source areas include adjacent (off-Site) properties located east and south of the source areas; and the GMR/floodplain area located west and north of the source areas. This may include residents, workers, trespassers, and recreation users.

The preliminary CSM is illustrated on Appendix B. Figures B.1 and B.2 show the CSM for human health bas eline conditions for OU1 and OU2 sou rce areas , respectively. Figure B.3 shows the CSM for ecological receptors for both source areas.

Comment [LJP4]: Add a description of the ecological setting to support the current understanding of potential exposure pathways ecological receptors.

Each figure shows the primary source area, release mechanisms, secondary and tertiary sources, the exposure route, an d the potentially exposed receptors. The figures also indicate the designations for operable units, in terms of which potentially complete pathways are addressed by either OU1 or OU2. In addition, the pathways being addressed by current vapor intrusion studies are also indicated.

The preliminary CSM for human health is intended to be updated and refined as additional information is collected during the RI/FS. This will include assessment of current and future conditions, and ecological receptors as necessary.

4.0 PRELIMINARY IDENTIFICATION OF RESPONSE OBJECTIVES AND REMEDIAL TECHNOLOGIES

4.1 PRELIMINARY REMEDIATION OBJECTIVES

The preliminary objectives for the remedial action at the Site[4] are identified in the SOW, which is appended to the ASAOC. As stated in the SOW, the strategy for achieving the remedial objectives and general management of the Site will include the following:

- *Conduct a remedial investigation to fully determine the nature and extent of the release of hazardous substances, poll utants, or contaminants in all Site areas and/or media not addressed by the Presumptive Remedy approach, and in all Site areas and/or media where the Respondents have not clearly indicated that there is a basis for remedial action and that a Presumptive Remedy approach is appropriate*
- *Perform a conventional feasibility study to identify and evaluate a full range alternatives for the appropriate extent of remedial action to meet the remedial action objectives, and to prevent or mitigate the migration or the release or threatened release of hazardous substances, pollutants, or contaminants of concern from the Site*
- *Gather sufficient data, samples, and other information to fully characterize Site geology, hydrogeology, the nature and extent of contamination at th e Site, contaminant fate and transport mechanisms, and to support the human health and ecological risk assessments conducted for the Site*

Task 1 in the SOW identifies preliminary objectives for the remedial action at the Site.

Respondents propose the following objectives for contaminant sources and affected media in OU2.

- Eliminate, to the extent practicable, direct contact with solid waste and surface and subsurface soil that pose an unacceptable current or potential future risk to potential receptors
- Eliminate, to the extent practicable, exposure to Site-related groundwater contaminated above MCLs that poses an unacceptable current or potential future risk to potential receptors

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4 The Site has been defined in the SOW as an area of approximately 80 acres, including Valley Asphalt plant in the northernmost portion of the Site (Parcels 5171 through 5175), an auto salvage yard in the southeast (Parcels 753 and 4423) and a gravel pit/quarry pond (the Quarry Pond, Parcels 3274 and 5178) in the southern part of the Site.

- Eliminate, to the exten t practicable, exposure to contaminated surface water and sediments that pose an unacceptable current or potential future risk to the extent practicable
- Reduce potential for exposure to Site wetland areas that pose an unacceptable current or potential future risk to potential receptors
- Eliminate, to the extent practicable, infiltration and resulting contaminant leaching to groundwater and surface water in areas where Site-related contaminants are currently leaching, or have the potential to leach, at concentrations that pose or would pose an unacceptable current or potential future risk to potential receptors
- Reduce the mobility, toxicity, and/or volume of Site-related hazardous substances, pollutants, or contaminants in areas that are defined as "hot spots" in accordance with USEPA guidance to the extent practicable to protect potential receptors
- Control migration of contaminated leachate that poses an unacceptable current or potential future risk to potential receptors to its beneficial use
- Restore groundwater that poses an unacceptable current or potential future risk to potential receptors to its beneficial use
- Control Site-related landfill gas and soil vapors that pose an unacceptable current or potential future risk to potential receptors

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Comment [LJP5]: Clarify if this means the floodplain also.

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Comment [LJP6]: When and how are hot spots identified?

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4.2 PRELIMINARY REMEDIAL TECHNOLOGIES

In accordance with USEPA guidance, the following subsection presents preliminary general response actions and a preliminary list of remedial technology types for the Site.

4.3 PRELIMINARY GENERAL RESPONSE ACTIONS

In accordance with USEPA guidance (1988) general response actions are initially defined during scoping and are refined throughout the RI/FS as information is gained and action-specific ARARs are identified. General response actions for the Site may include no action/institutional actions, contai nment, collection, excavation, treatment, disposal, or a combination of these.

4.4 PRELIMINARY REMEDIAL TECHNOLOGY TYPES

CRA identified several remedial technology types and process options for each applicable general response action to satisfy the objectives discussed in Section 4.1.

Following the OU2 remedial investigation, CRA will screen process options relative to technical implementability based on the OU2 Site -related contaminant types and concentrations, and other Site characteristics.

The preliminary remedial technology types and general process options are presented as follows:

- No action

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Institutional Options

- Zoning restrictions
- Deed/use restrictions
- Restrictive covenants
- Fencing/signs/markers
- Groundwater use restrictions

Containment Technologies

- Cap
- Stabilization/Solidification
- Hydraulic containment
- Physical barriers (sheet piles, grout curtains, etc.)

Removal and Extraction Technologies

- Excavation
- Drum removal
- Extraction wells
- Interceptor trenches
- LFG venting, collection, or flaring

Treatment Technologies

- Physical or Chemical Separation
- Enhanced in situ biodegradation

- Activated carbon adsorption
- Air sparging
- Permeable treatment barrier (PTB)/permeable reactive barrier (PRB)
- Biological treatment
- Chemical/ultraviolet (UV) oxidation

Discharge/Disposal Technologies

- On-Site disposal
- Off-Site disposal
- Ambient air discharge
- Reinjection
- Surface water discharge

Other Technologies

- Monitoring
- Well Abandonment
- Wetland Mitigation
- Monitored Natural Attenuation

As the OU2 RI progresses, the list of remedial technology types and process options will be refined for each medium of interest. In the FS, the options will be screened to identify those technologies to be further evaluated and combined as appropriate to develop remedial alternatives.

Comment [LJP7]: Indicate when and how you will determine whether additional data are needed to evaluate remedial alternatives, and how that will be communicated to the agencies.

4.5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

As stated in USEPA, 1988, "Section 121(d)(2)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that Superfund RAs meet any Federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs)." Further, "State ARARs must be met if they are more stringent than Federal requirements" (USEPA, 1988)[5].

[5] Section 121 (d)(2)(A) of CERCLA states "With respect to any hazardous substance, pollutant or contaminant that will remain onsite, if – (i) any standard, requirement, criteria, or limitation under any

Ohio law does not include a parallel ARAR process; however, the Ohio EPA Division of Environmental Response and Revitalization 's administrative orders for Site cle anup require that remedial actions (RAs) be undertaken in a manner consistent or not inconsistent with the National Contingency Plan (NCP, 40 *Code of Feder al Regulations* [CFR], Part 300). Therefore, in order to maintain consistency with the NCP, Ohio EPA follows the federal ARARs process. In spite of a permit exemption under CERCLA law, there is no e xemption under state l aw and it has be en Division of Emergency and Remedial Response's policy to require responsible parties to acquire and comply with all necessary permits, including all substantive and administrative requirements.

Comment [LJP8]: Per Ohio EPA, this paragraph is not relevant to federal superfund work and should be removed.

ARARs and To-Be-Considered (TBC) criteria are defined as follows:

- Applicable Requirements are cle anup st andards, standards of control, and other substantive requirements, c riteria, or limitations promulgated under Federal environmental or state e nvironmental laws that specifically add ress a hazardous substance, pollutant, c ontaminant, RA, l ocation, or other circumstance found at a CERCLA site.
- Relevant and Appropriate Requirements are cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or state environmental laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, RA, location, or other circumstance at a CERCLA site, add ress problems or situations sufficiently similar to t hose encountered at the CERCLA site and are well-suited to the particular site.
- To-Be-Considered Criteria consist of advisories, criteria, or guidance that were developed by USEPA, other federal agencies, or states that may be useful in developing CERCLA remedies and include non-promulgated guidance or advisories that are not legally binding and that do not have the status of potential ARARs. TBCs generally fall within three categories: health effects information with a high degree of credibility, technical information on how to perform or evaluate Site investigations or response actions, and policy.

Federal environmental law...; or (ii) any promulgated standard, requirement, or limitation under a State environmental or siting law that is more stringent than any Federal standard, requirement, criteria, or limitation ... and that has been identified ... in a timely manner, is legally applicable to the hazardous substance or pollutant or contaminant concerned or is relevant and appropriate under the circumstances of the release or threatened of such hazardous substance or pollutant or contaminant, the remedial action selected ... shall require, at the completion of the remedial action, a level or standard of control for such hazardous or pollutant or contaminant which at least attains such legally applicable or relevant or appropriate standard, requirement, cri teria, or limitation."

USEPA has divided ARARs into three categories: chemical-specific, location-specific, and action-specific, described as follows:

- Chemical-Specific ARARs are usually health- or risk-based numerical values or methodologies, which, when applied to Site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.
- Location-Specific ARARs apply to the geographical or physical location of the Site. These requirements limit where and how the RA can occur.
- Action-Specific ARARs include performance, design, or other controls on the specific activities to be performed as part of the RA for a site.

Potential ARARs and To-Be-Considered Criteria, along with a brief description of each are provided in Appendix D. The potential ARARs and TBC criteria in Appendix D are based on determinations made following OU1 RI/FS Investigations . During the OU2 RI/FS, information will be collected to assist in finalizing the preliminary evaluation of potential ARARs.

As specified in the NCP under 40 CFR Section 300.430(f)(1)(i), six circumstances under which ARARs may be waived are as follows:

(1) The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement

(2) Compliance with the requirement will result in greater risk to human health and the environment than other alternatives

(3) Compliance with the requirement is technically impracticable from an engineering perspective

(4) The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach

(5) With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state

(6) For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and

the environment at the Site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment

5.0 PROPOSED FIELD INVESTIGATION ACTIVITIES

5.1 DATA QUALITY OBJECTIVES

USEPA Data Quality Objectives (DQOs) are a flexible and iterative planning process used to determine the type, quantity, and quality of data required in order to obtain defensible decisions. The DQO process consists of seven iterative steps, as follows:

- Step 1: State the Problem. Define the probl em that necessitates the study: identify the planning team, examine budget and schedule.
- Step 2: Identify the Goal of the Study. State how environmental data will be used in meeting objectives and solving the problem, identify study questions, define alternative outcomes.
- Step 3: Identify Information Inputs. Identify data & information n eeded to answer study questions.
- Step 4: Define the Boundaries of the Study. Specify the target population and characteristics of interest, define spatial and temporal limits, scale of inference
- Step 5: Develop the Analytic Approach. Define the parameter of interest, specify the type of inference, and develop the logic for drawing conclusions from findings.
- Step 6: Specify Performance or Acceptance Criteria.
- Step 7: Develop the Plan for Obtaining Data. Select the resource-effective sampling and analysis plan that meets the performance criteria.

CRA developed DQOs for OU2, based on results of previous investigations, and data gaps. All data collected will ultimately be used in the Baseline Risk Assessment for OU2. The DQO development process is detailed in Tables 3.1 through 3.6 and summarized in the following sections. The Respondents propose to complete a series of phased investigations to assist in the characterization of various OU2 media and identify data requirements for subsequent assessment and delineation. The first phase will include investigations to determine the nature and extent of contamination, while the second phase will focus on determination of risks to human health and the environment. Respondents will prepare and submit separate letter work plans for the investigations proposed in the following sections.

Comment [LJP9]: Somewhere in the text, state why two phases are expected to be sufficient, and provide for the possibility that one or more media may need a third phase of data collection by describing the process for completing that third phase (e.g. a TM outlining the reasons for and proposing the third phase will be submitted to EPA for approval, how any delays this will cause will be dealt with, etc.)

Comment [LJP10]: This appears to be the case in Tables 3.1, 3.5 and 3.6, but not the other tables. Review the problem description in Tables 3.2-3.4 and either revise the text in 5.1 to accurately describe the phases, or revise the language in Phase 3 of the DQO tables.

5.2 OU2 PARCELS FILL INVESTIGATION

Comment [LJP11]: DQO Table 3.1 has this as a fill and soil investigation, but this seems to be focused on fill. None of the objectives in 5.2 pertain to investigating soil except as a precursor to soil gas investigation.

The objectives of the Fill Investigation within the OU2 Parcels include:

- Determination of the lateral and vertical extent of the fill material to support the overall site assessment
- Characterization of the fill material (surface and subsurface) to identify direct contact risks, for input to the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA)
- Determine if potential impacts are the result of historic operations, current business operations or the result of off-Site sources
- Based on results of the overlying fill investigation, characterization of groundwater quality below the fill material to assess potential groundwater impacts due to the presence of the fill
- Based on the results of the soil and groundwater investigation, characterization of soil gas conditions within the fill material to assess potential impacts to ambient air and nearby occupied structures

Comment [LJP12]: This is different than comparing to background – how will this determination be made?

DQOs for fill (soil), groundwater, and soil gas within OU2 are presented in Tables 3.1, 3.2, and 3.3, respectively.

The Phase 1A investigation of the fill within OU2 will include surface and subsurface soil and groundwater sample collection and analyses to identify direct contact risks and risks to groundwater as outlined below:

- Completion of approximately 40 soil borings within the Quarry Pond Parcels at the approximate locations shown on Figure 3.1.
- Collection of continuous samples to log the subsurface conditions, through the entire thickness of the fill material and up to approximately 5 feet into the underlying native material.
- Collection and analyses of soil/fill samples for laboratory analysis (Target compound list (TCL) volatile organic compounds (VOCs), TCL semi-VOCs (SVOCs), TCL pesticides/polychlorinated biphenyls (PCBs), TCL herbicides, TAL metals, and cyanide) from each soil boring from the following intervals:
  - 0 to 2 feet bgs
  - One discrete sample interval selected from the fill material, if found, below 2 feet bgs, based on field screening results

Comment [LJP13]: What field screening is proposed for analytes other than VOCs?

- Collection and analysis of groundwater samples for laboratory analysis (TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, TAL metals and cyanide) from each soil boring where groundwater is encountered, using a temporary well screen positioned at the depth of the water table. These data will serve to provide an indication of potential impacts to groundwater related to infiltration of surface water through the fill material.
- Completion of soil gas monitoring if required based on conditions determined from soil borings, as discussed in Section 5.2.1.

Phase 1B consists of an off-Site background soil investigation that will be completed concurrently with Phase 1A. The Respondents will collect background soil samples from nearby properties, if accessible, and which are not associated with current or historic industrial activity. The data collected from the soil sampling locations in the OU2 Parcels (Phase 1A) will be compared to background conditions to determine if there are any measureable inputs of contaminants from the Site, or if contaminant concentrations are due to naturally occurring background concentrations.

Phase 2 consists of additional sampling, if necessary, to develop risk assessment exposure estimates. If soil containing contaminant concentrations greater than performance and/or acceptance criteria is found in Phases 1A and 1B, additional soil samples will be collected to delineate soil impacts or to remove data gaps.

5.2.1 SOIL VAPOR MONITORING

CRA and USEPA completed vapor intrusion studies in 2012 and 2013 to assess potential effects of soil vapor on occupied buildings located on and in the immediate Site vicinity. In order to further assess soil gas conditions within the OU2 fill material, CRA will install temporary soil gas probes at selected locations (using the methods described in the 2011 VI WP?), dependent on the observations CRA makes during the drilling of the soil boring specifically, if CRA identifies evidence of waste or chemically-impacted material. CRA will provide a description of the proposed probe locations to USEPA for review, if they are needed, prior to implementing the work. The probes will be used for soil gas monitoring, augmenting the existing probes located within the OU2 Parcels, to determine the presence of VOCs and explosive gases using field instruments. CRA will assess the need for further soil gas monitoring within or beyond the fill material limits, or subslab sampling, based on the results of the initial monitoring.

Comment [LJP14]: Phase 1 on Table 3.3 appears to be part of Phase 1 on Table 3.1. If so, this needs to be more explicit in the text; this paragraph is only describing Phase 2 work because Phase 1 work was described in 5.2 above?

Comment [LJP15]: This appears to correlate with Tier 3 of the investigation process in the 2002 OSWER VI guidance. Make that clear by adding a statement about that and referring to the guidance.

There are current, occupied buildings in OU 2. Though these may have been addressed in previous vapor intrusion investigation and remediation efforts, this should be discussed.

5.3 QUARRY POND INVESTIGATION

The objectives of the Quarry Pond investigation include:

- Determination if non-native material exists at the base of the Quarry Pond (to determine if the operators filled the area in prior to constructing the pond)
- Characterization of surface water quality as input to the HHRA and ERA
- Characterization of sediment quality as input to the HHRA and ERA

DQOs for surface water and sediment are presented in Tables 3.4 and 3.5, respectively.

The Phase 1A investigation of the Quarry Pond will include surface water and sediment sampling to identify direct contact risks and risks to potential ecological receptors as outlined below:

- Sediment samples will be collected at approximately nine locations, as shown on Figure 3.3. The sample locations may be adjusted based on the locations of intermittent drainage pathways, storm water runoff pathways, if any are identified, and the results of underwater survey inspections conducted by Ohio EPA, Ohio DNR and the District Attorney's office, to include consideration of any areas where foreign objects may have been deposited and the likelihood of sediment contamination may be greater.
- Each sediment sample will be collected from the upper 6 inches of the sediment material and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, TAL metals and cyanide parameters.
- Surface water samples will be collected at approximately five locations as shown on Figure 3.3. The surface water sample locations will be adjusted based on the location of intermittent drainage pathways from storm water runoff, if any are identified.
- Each sample will be collected from approximately the mid-point of the water column and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, TAL metals and cyanide parameters.

Based on the results of the Phase 1A investigations discussed above, CRA will determine the need for additional (Phase 1B) data collection. This may include, for example, collection of surface water and sediment samples from background locations; and additional sample collection from the Quarry Pond to refine the distribution of COCs.

Comment [LJP16]: Sediment samples should be collected from areas more accessible to humans and with evidence of use (e.g., where anglers or other recreators are present; areas where water is approximately 3 ft deep and where sediment can support body weight).

Comment [LJP17]: Provide a rationale for this analyte list.

We recommend that major cations and anions, indicator parameters (pH, temperature, conductivity, oxidation reduction potential, and dissolved oxygen), and the following REDOX sensitive parameters: nitrate, manganese, iron, and sulfate also be measured. These parameters are not expensive, they will aid in determining the nature of contamination in the QP from various sources, and may assist evaluation of alternatives for the QP in the FS.

Phase 2 consists of additional sampling, if necessary, to develop risk assess ment exposure estimates. If surface water and sediment containing contaminant concentrations greater than performance and/or accepta nce criteria is found in Phases 1A and 1B, additional samples will be collected to delineate surface water and/or sediment impacts or to remove data gaps.

5.4 FLOODPLAIN INVESTIGATION

The objectives of the Floodplain investigation include:

- Characterization of the surface soil as input to the HHRA and ERA
- Determine if potential Floodplain soil contamination is a result of migration from the Site

DQOs for soil within the Floodplain are presented in Table3.6.

The Phase 1 investigation of the GMR floodplain will include soil sample collection and analyses from the floodplain to identify direct contact risks as outlined below:

- Surface soil samples will b e collected at approximately 15 locations within the floodplain adjacent to the OU1 Presumptive Remedy Area (PRA) and OU2 Parcels as shown on Figure 3.2
- At each location soil samples will be collected from two d epth increments, i.e., 0 to 0.5 feet bgs and 1 to 2 feet bgs, which is relevant for data use in the OU2 RI Report and in the HHRA and ERA
- Samples will be submitted for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, TAL metals, and cyanide analyses

Comment [LJP18]: Phase 1A states that subsurface samples will be collected if necessary, but Phase 2 doesn't provide for the possibility of sampling soil below 2 feet. The decision logic that will be used in determining whether subsurface soils will be collected from floodplains is not clear in Section 5.4.

For the ecological risk assessment, taking samples to 3ft. bgs. for COC screening is appropriate.

Phase 1B consists of an off -Site background soil investigation that will be completed concurrently with Phase 1A. Surface soil samples will b e collected at approximately ten locations within the floodplain upstream of the Site to establish local backgroun d locations. The data collected from the soil sampling locations in the floodplain (Phase 1A) will be compared to background conditions to determine if there are any measureable inputs of contaminants from the Site, or if contaminant concentrations are due to naturally occurring background concentrations.

Phase 2 consists of additional sampling, if necessary, to develop risk assessment exposure estimates. If soil contains contaminants at concentrations greater than performance and/or acceptance criteria is found in Phases 1A and 1B, additional soil samples will be collected to delineate soil impacts or to remove data gaps.

5.5 GMR INVESTIGATION

The objectives of the GMR investigation include:

- Determine if the Site significantly adds to contaminants in sediment and surface water in the GMR
- Characterization of the surface water quality as an input to the HHRA and ERA
- Characterization of sediment quality as an input to the HHRA and ERA

DQOs for surface water and sediment are presented in Tables 3.4 and 3.5, respectively.

The Phase 1A investigation of the GMR will include surface water and sediment sampling to identify direct contact risks and risks to potential ecological impacts as outlined below:

- Sediment samples from approximately 12 locations within the GMR adjacent to the PRA and OU2 Parcels as shown on Figure 3.4. The sediment sample locations may be adjusted based on the location of intermittent drainage pathways (if any).
  - CRA will collect each sediment sample from the upper 6 inches of the sediment material and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, TAL metals, and cyanide parameters
- Surface water samples from approximately 12 locations within the GMR adjacent to the PRA and OU2 Parcels as shown on Figure 3.4. The surface water sample locations will be adjusted based on the location of intermittent drainage pathways and GMR discharge points, if any are identified.
  - CRA will collect each surface water sample from approximately the mid-point of the water column and analyzed for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TCL herbicides, and TAL metals parameters

Phase 1B consists of an upstream background GMR surface water and sediment investigation that will be completed concurrently with Phase 1A. Sediment samples from three transects and surface water samples collected from two transects regularly space upstream of the Site will be collected on two separate sampling rounds. The data collected from the GMR surface water and sediment sampling locations (Phase 1A) will

Comment [LJP19]: Sediment samples should also be collected from areas more accessible to humans and with evidence of use (e.g., where anglers or other recreators are present; areas where water is approximately 3 ft deep and where sediment can support body weight). (same as above comment)

Comment [LJP20]: Provide a rationale for this analyte list (or refer to rationale in 5.3). (same as above comment)

Comment [LJP21]: Additional information is needed in regards to the how the background sediment and surface water sampling locations were selected and why the locations are localized in a small area immediately upriver from the site.

In order to determine if the site is impacting GMR above background conditions, upgradient locations should be selected that are of similar lithology as well as being spatially representative of upgradient background conditions.

Why is the upgradient sampling is proposed to occur over two sampling rounds whereas the site adjacent samples are proposed to be collected only during one round?

be compared to background conditions to determine if there are any measureable inputs of contaminants from the Site, or if contaminant concentrations are due to naturally occurring background concentrations. Upstream background sample locations will be collected along transects regularly spaced upstream of the Site and downstream of the dam.

Phase 2 consists of additional sampling, if necessary, to develop risk assessment exposure estimates. Based on the results of the Phase 1A and 1B investigations discussed above, CRA will determine the need for additional data collection. This may include, for example, additional surface water or sediment sampling in the river to refine the distribution of COCs; and benthic studies to assess possib le ecological receptors.

5.6 GROUNDWATER INVESTIGATION

CRA will propose the scope of, and DQOs for, the final OU2 Groundwater Investigation following completion of the current preliminary Groundwater Investigation. Also, the final OU2 Groundwater Investigation scope will be developed based on data collected from the initial phases of the OU2 investigation. OU2 groundwater investigative locations (i.e., temporary monitoring wells; permanent monitoring wells; VAS locations) will b e installed based on the results of the current preliminary Groundwater Investigation and all existing data, including hydrostratigraphic and groundwater/surface water flow data.

Comment [LJP22]: (Similar comment to Section 5.2.1). Unclear, is this the same data as Table 3.1 Phase 1? Are data being collected specifically for the groundwater Phase 1 DQO, or do the data collected during Phase 1 of the soil/fill investigation serve as the Phase 1 data for BW? If so, they need to be more clearly linked and the collective Phase 1A described in one place, with a reference here to that.

6.0 BACKGROUND COMPARISONS

Comment [LJP23]: Sampling locations are presented for the other aspects of the OU2 RI, so the background locations should be included in this document for consistency. Or a letter workplan for BG sampling needs to be specified as a deliverable.

For elements of the investigation requiring a comparison to background (e.g., upgradient or upstream) conditions, the following methodology will be used. Such comparisons are noted particularly for the following investigation elements, but the methodology presented herein may also be applied to additional items, if identified during the course of the investigation.

- Soil and Fill on Southern Parcels, Phase 1B (Comparison to Background)
- Groundwater, Phase 1B (Comparison of Soil to Background)
- Surface Water, Phase 1B (Comparison to Upstream)
- GMR Sediment, Phase 1B (Comparison to Upstream)
- GMR Sediment, Phase 2 (if required) (Comparison to Upstream)

Comment [LJP24]: A BG soil comparison makes sense but the purpose of comparing fill to BG is unclear.

6.1 BACKGROUND COMPARISON APPROACHES

Evaluation of site vs. background conditions using environmental quality data is typically carried out using either group-based or individual-based statistical comparisons. Group-based comparisons pool the data from a number of samples collected at a site (e.g., from within an area of interest) and contrast these against a pooled set of background samples. In such a case, a determination may be made as to whether or not the site area of interest as a whole is consistent with or above background conditions. In contrast, individual-based comparisons make a decision (i.e., consistent with or above background) for each investigative location at the site. In terms of the different elements of the proposed investigations, group-based background comparisons may be applicable for portions of the baseline risk assessment, but the majority of testing will consider individual point comparisons (site vs. background) for the purposes of identifying and delineating potential areas of the site that appear to have contaminants present above background conditions.

For individual-based comparisons against background, the statistical approaches employed typically establish an expected range (e.g., 95th or 99th percentile) of contaminant concentrations based on the background sample results, against which the site data compared. A site result falling outside of the expected background range is identified as being potentially impacted, and is further evaluated to confirm this finding (e.g., using confirmatory sampling or considering the spatial patterns of results in other site samples collected nearby). Confirmation is required due to the statistical nature of the background expected range calculations, which result in infrequent occurrence of background conditions outside of the range (e.g., 1 in 20 background samples for a 95th percentile range, or 1 in 100 for a 99th percentile range).

For group-based comparisons against background, the statistical approaches employed typically compare the site and background groups based on distributional characteristics (e.g., mean, median, or percentile values) through the use of hypothesis testing. In carrying out such tests, statistically-significant findings provide strong evidence that contaminant concentrations found in the area of the site considered are different than those present in background areas.

When designing and implementing an environmental investigation where background comparisons are to be made, it is important to try to match background sampling media to those present at the site, as far as is possible. That is, matching soil types/textures, including multiple soil types if necessary due to site stratigraphy, groundwater aquifers, etc. This prevents the finding of differences between site and background conditions due to factors unrelated to activities at the site (e.g., different native mineralogy in different soil layers under a site).

6.2 RELEVANT GUIDANCE AND REFERENCES

The issue of appropriate background comparison techniques is discussed in numerous guidance and environmental statistic texts. The methods proposed for the investigations have been selected for consistency with the following documents.

- USEPA, June 1994. Statistical Methods for Evaluating the Attainment of Cleanup Standards. Volume 3: Reference-Based Standards for Soil and Solid Media. Environmental Statistics and Information Division (2163), Office of Policy, Planning, and Evaluation. EPA 230-R-94-004.
- NAVFAC, 2004. Guidance for Environmental Background Analysis. Volume III: Groundwater. Naval Facilities Engineering Command. User's Guide UG-2059-ENV. Port Hueneme, California.
- USEPA, September 2002. Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites (OSWER 9285.7-41). Office of Emergency and Remedial Response, United States Environmental Protection Agency, Washington, DC. EPA/540/R-01/003.
- USEPA, February 2006. Data Quality Assessment: Statistical Methods for Practitioners (EPA QA/G-9S). Office of Environmental Information, United States Environmental Protection Agency, Washington, DC. EPA/240/B-06/003. [Available

at http://www.epa.gov/QUALITY/qs-docs/g9s-final.pdf]. [Section 3.3 in particular].

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For the purposes of individual-based background comparisons (e.g., used in detection monitoring or for delineation of contamination), a general approach found though these references is to use a statistical tolerance or prediction limit to establish a background threshold value (BTV), which is the upper[6] expected range of background concentrations given by a certain percentile of background (e.g., 95th or 99 th). Consequently, for elements in the present investigation where individual-based background comparisons are required, BTVs based on statistical upper tolerance limits (UTLs) for the 95th and/or 99th percentile of background have been selected for use. A detailed discussion of UTL calculation methods is found in Chapters 3 and 5 of USEPA's ProUCL version 4.1.00 technical guide (2010, see list above).

For the purposes of group-based background comparisons (e.g., when comparing contaminant concentration within an area of concern vs. background as part of a risk assessment), different hypothesis tests are available in the references above. Where certain statistical assumptions are met by the data sets considered (e.g., normal distribution, homogeneity of variance), parametric statistical tests are available (e.g., analysis of variance, Student *t*-test). Where these assumptions are not met by the available data, analogous non-parametric (rank-based) statistical methods are available (e.g., Mann-Whitney/Wilcoxon Rank-Sum test, modified Quantile test). Where required for the present investigation, statistical group comparisons will be carried out using the

[6] In certain cases, a lower limit may also be considered, e.g., for pH or oxygen content in water, but upper limits are much more commonly encountered.

Mann-Whitney/Wilcoxon Rank-Sum test and modified Quantile test, supplemented by the Student *t*-test where assumptions of the parametric test are met.

6.3 STATISTICAL CONSIDERATIONS

In order to achieve an appropriate and successful statistical comparison of site and background conditions, a number of factors will be considered during sampling design and data analysis. These factors include:

- Background sample size – a minimum of eight to ten background samples will be collected for each environmental medium (soil, groundwater, sediment and/or surface water), and/or stratum within the medium (e.g., different soil types and/or aquifers).
- The desired minimum confidence level to be used in the statistical comparisons is 95 percent (i.e., statistical significance of $\alpha = 0.05$).
- The specific statistical method used needs to be appropriate for the observed characteristics of the site and/or background data sets obtained. This requires assessing each data set for the following statistical parameters:
  - Percentage of non-detect values
  - Statistical data distribution (e.g., testing for normal, gamma and lognormal distributions, per USEPA's ProUCL version 4.1.01 software's approach)
  - Statistical outliers (particularly in background data sets)
- QA/QC samples – where field duplicate samples are collected and submitted for laboratory analysis, the resulting data will be averaged prior to statistical calculations in order to avoid over-weighting the sampling location where duplicates were collected.
- Confirmatory analysis and/or resampling – for point-based background comparisons using BTVs, it is recognized that periodic occurrence of parameter concentrations above a BTV are expected by natural variation in the background population (e.g., 1 in 20 samples for a 95th percentile based BTV). Where a site observation exceeds the 95th percentile BTV, it will additionally be compared to a 99th percentile BTV. If the result falls below the 99th percentile BTV, and no spatially-adjacent observations also exceed the 95th percentile BTV, the site observation will be considered to not indicate a site-related effect. However, if the site result exceeds the 99th percentile BTV or another adjacent site result also is above the 95th percentile BTV, then it will be considered to indicate an

above-background condition, unless a confirmatory resample is collected and found to not be above the BTV.

6.4 SUMMARY OF STATISTICAL METHODS SELECTED FOR BACKGROUND COMPARISONS

Comment [LJP25]: The individual and group-based comparisons will not always conclude either that the Site data does or does not exceed background. The approach for making this decision after seeing the specific data results should be discussed in the work plan.

In consideration of the information presented above, as well as the objectives of the present investigation as detailed in the DQO tables, the following methods will be used for comparing contaminant concentrations in environmental samples collected at the site against concentrations observed in ambient background samples.

1. For point-based comparisons (i.e., as described for Phases 1B of the different investigations described in the DQO tables for all media except soil gas), BTVs will be calculated using the available background data:
   - If greater than half of the background data are non-detects, or if a background data set is not found to follow a discernible statistical distribution, then a non-parametric UTL on the 95th percentile of background (with 95 percent confidence) will be generated for use as the BTV. This will be done following the methods in USEPA's ProUCL version 4.1.01 software (USEPA, 2010).
   - If no more than half of the background data are detects and a discernible statistical distribution (normal, gamma or lognormal) is found, then a parametric UTL on the 95th percentile of background (with 95 percent confidence) will be generated for use as the BTV. This will be done following the methods in USEPA's ProUCL version 4.1.01 software (USEPA, 2010).
   - Individual site data will be compared against the BTVs:
     - Where a site observation exceeds the 95th percentile BTV, it will additionally be compared to a 99th percentile BTV
     - If the result falls below the 99th percentile BTV, and no spatially-adjacent observations also exceed the 95th percentile BTV, the site observation will be considered to not indicate a site-related effect
     - However, if the site result exceeds the 99th percentile BTV or another adjacent site result also is above the 95th percentile BTV, then it will be considered to indicate an above-background condition, unless a confirmatory resample is collected and found to not be above the BTV

2. For group-based comparisons (i.e., as described for Phase 2 of the GMR sediment investigation, if necessary, and potentially as well a part of the baseline risk assessment):

- If both the site and background data sets contain few non -detects (less than 10 to 15 percent), and follow a common discernible data distribution (normal, gamma or lognormal), the non -detects will be substituted with a value of one-half their detection limit and the two groups compared using a Student's t-test at 95 percent confidence.
- If one or both of the site and background data s ets contain a moderate proportion of non-detects (between 15 and 50 percent), and follow a common discernible data distribution (normal, gamma or lognormal), a Student's t-test at 95 percent confidence will be carried out using the Kaplan -Meier (KM, see USEPA, 2010) adjusted estimates of the means and standard deviations for the two groups of data.
- In all cases where the site and background data sets combined contain up to 50 percent non-detects, non-parametric testing will be carried out contrasting the two groups using the Mann -Whitney/Wilcoxon Rank-Sum test and the modified Quantile test. For cases where a Student t-test has already been performed, this will be considered as a confirmatory test.
- For cases where a particular analyte has not been detected in either background or site samples, no statistical testing will be carried out
- For the remaining cases (detected, but in less than half of the samples in the pooled site and background data sets), alternate statistical comparisons will be carried sought on a case -by-case basis. This could include procedures such as a test of proportions in conjunction with the modified quantile test.

Comment [LJP26]: Kaplan-Meier estimates of means and standard deviations can be the strongest when the proportion of detections is relatively high, but those estimates are not commonly applied for two-sample comparisons such as the student's t-test.

Comment [LJP27]: The 2010 USEPA guidance document referenced below specifically warns against the use of log-transformed data sets in a t-test, which rules out application of this test when both data sets are log normally distributed. Gamma distributed data should also be seen as problematic with this test due to the skewed nature of the data. As the referenced USEPA guidance document suggests, when the data from both the site and background data are not normal, a nonparametric approach should be applied.

7.0 BASELINE RISK ASSESSMENT AND ECOLOGICAL RISK ASSESSMENT

Major components of the Baseline Risk Assessment (BRA) include constituents of potential concern identification, exposure assessment, toxicity assessment, and human health and ecological risk characterization.

Baseline Human Health Risk Assessment

CRA proposes to conduct the HHRA (or BRA) in accordance with *Risk Assessment Guidance for Superfund (RAGS Parts A-F).* These guidance documents, along with the *Exposure Factors Handbook* and recent *Cancer Risk Assessment* guidelines, are the default guidance documents for risk assessment under CERCLA. There are four key steps to the HHRA process: Data Collection and Evaluation, and Hazard Identification; Exposure Assessment; Toxicity Assessment; and Risk Characterization.

Data Collection and Evaluation, and Hazard Identification

Comment [LJP28]: Is data collection and evaluation complete and this is just the COPC selection process? Nothing is described with respect to DC and E.

Adequate definition of the Site characteristics and the nature and extent of impacts is an integral component of any risk assessment and is required to reduce uncertainty in the risk assessment findings. The selection of chemicals of potential concern (COPCs) will follow USEPA RAGS Part A, and all chemicals will be screened against the USEPA RSLs. For each medium, chemicals with maximum concentrations less than their respective screening value will not be identified as COPCs, and will not be retained in the HHRA quantitative process.

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Comment [LJP29]: Add text indicating that an interim deliverable consisting of USEPA RAGS D Tables 1 through 6, plus an appendix presenting the electronic database, will be provided to USEPA in Excel file format prior to preparation of RAGS D Tables 7 through 10 and prior to preparation of the HHRA text.

Add text indicating that USEPA will be contacted to request surrogate chemicals for detected analytes with missing screening values. Add text indicating that a comparison of chemicals that are 100% nondetected in an environmental medium with screening levels will be presented as an appendix to the HHRA, and discussed in the uncertainty analysis section of the HHRA.

Exposure Assessment and Documentation

In the exposure assessment, analysis of contaminants through various exposure pathways will be conducted to determine which pathways and routes of exposure are the most significant. This will include an analysis of the presence, fate, and transport of contaminants, and a discussion of the potential exposure pathways, routes of exposure, exposure media, and receptors to be considered in the HHRA, which will be used to refine the CSM discussed in the Work Plan. The exposure assessment will include the identification of receptor exposure variables such as exposure frequency, exposure duration, absorption factors, and intake rates. In accordance to guidance, both Reasonable Maximum Exposure (RME) and Central Tendency (CT) exposure scenarios will be applied and evaluated in the HHRA.

Comment [LJP30]: Central tendency calculations should be presented only for exposure media where the RME scenario exceeds USEPA's acceptable risk levels. Central tendency calculations should be provided as a separate appendix to the HHRA, and discussed in the uncertainty analysis section of the HHRA.

Toxicity Assessment and Documentation

The toxicity assessment will identify the types of adverse health effects a COPC may potentially cause, and to define the relationships between the magnitude of exposure (dose) and the occurrence of specific health effects for a receptor (response). For the HHRA, CRA follows USEPA's process of estimating risk for both potential cancer and non-cancer effects. The dose-response factors for potential carcinogenic compounds are termed Cancer Slope Factors (CSFs), and dose-response factors for potential non-carcinogenic compounds are termed Reference Doses (RfDs). The USEPA guidance provides a hierarchy for the selection of dose-response values in the risk assessment process. The USEPA Integrated Risk Information System (IRIS) is by far the best source of these values because of its high level of peer review. USEPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) from the National Center for Environmental Assessment (NCEA) will be applied as a second tier source. These values are based upon revised values from HEAST tables. The California Environmental Protection Agency (Cal EPA), the Agency for Toxic Substances and Disease Registry (ATSDR), and HEAST tables will be consulted as third tier sources. As toxicological information becomes available on chemical compounds and elements the USEPA will update its IRIS database by withdrawing toxicity values and listing new ones. Occasionally toxicity values are withdrawn before a replacement value is approved through the extensive peer review process used by USEPA.

Comment [LJP31]: Add text to indicate that Unit Risk Factors and Reference Concentrations will be used for evaluating inhalation exposures.

Risk Characterization

For the risk characterization, estimates of potential carcinogenic and non-carcinogenic risks will be quantified for each evaluated exposure pathway based on the exposure and toxicity assessments. Estimated cancer risks for identified exposure pathways will be considered significant when greater than the identified acceptable risk level or range (1.0E-04 to 1.0E-06), while non-carcinogenic hazard estimates will be considered significant when greater than 1. As part of the risk characterization, potential risk from background Site conditions may be estimated through a risk assessment using analytical data from background media samples. The background risk determination will be used to qualify the risk estimates for COPCs identified in Site media where applicable. Following risk characterization, an assessment of the uncertainty associated with the assumptions used throughout the HHRA process will be conducted to determine the level of confidence attributed to the characterization of risk.

Ecological Risk Assessment

The ERA will be completed in accordance with *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997) and the guidance listed in the SOW . This guidance, which is the standard by which ecological risk assessments are conducted under Superfund and other federal and state programs, is based on an 8-step process. Steps 1 and 2 are the screening or preliminary assessment and can end the process if justification can be provided. If the screening-level assessment identifies an unacceptable potential for ecological risk then a more detailed site-specific assessment following steps 3 through 8 should be conducted.

The screening-level assessment, (Steps 1 and 2 of the 8-step process) will identify constituents with concentrations above ecologically-based benchmarks (constituents of potential ecological concern [COPCs or COECs]), those media (i.e., surface water, sediments, soil) with elevated concentrations of COECs, and those ecological receptors (e.g., fish and macroinvertebrate community) most likely to have an unacceptable potential for risk.

Comment [LJP32]: As per the USEPA ERA guidance, Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997), all potentially complete pathways and receptors (lower and upper trophic receptors) need to be evaluated as part of the SERA.

The first step in the ERA is problem formulation. In this step, CRA will review available documents to identify those chemical constituents that are known or expected to be present and define the environmental setting (i.e., types of cover types/habitats present and potentially complete exposure pathways). In addition, CRA will identify the fate and transport characteristics and mechanisms of ecotoxicity of the COECs. Assessment endpoints for the problem formulation will also be identified. The problem formulation step will include a one-day site inspection by an experienced ecologist. In addition to facilitating characterization of the environmental setting, the site inspection will allow CRA to identify Site-specific receptors, critical habitats, and other environmentally sensitive areas on and adjacent to the site. Furthermore, the Site inspection will be useful in identifying complete and eliminating incomplete exposure pathways for evaluation in the screening-level ERA.

The second step in the screening-level ERA is the ecological effects evaluation. In this step, CRA will identify screening ecotoxicological values, and compare them to on-Site concentrations of the COECs. For surface water, sediments, and soils, the maximum concentration of each COC detected in each media will be compared to its screening ecotoxicological value. If characterization of the environmental setting and Site inspection indicate that higher trophic level receptors (e.g., fish, eating birds, and mammals) may be impacted by the COECs, then CRA will utilize a simple food chain model to estimate intake of COECs for representative upper-level receptors. As required by USEPA guidance, CRA will use conservative assumptions and conservative screening ecotoxicological values will be used. For each receptor evaluated, the estimated intake of COECs will be compared to appropriate screening toxicological values.

Comment [LJP33]: Provide more detail (or refer to the location of more detail).

Upon completion of Step 2, CRA will prepare a memorandum to USEPA documenting the methods and results of the screening-level ERA. CRA's memorandum will identify the COECs, media with elevated concentrations of COECs, and potentially affected ecological receptors. Based on the extremely conservative nature of the screening-level ERA, CRA believes there is a high probability that one or more of the COECs will exceed their screening eco-toxicological values, indicating the need for further evaluation of ecological risk. CRA's memo will include a section that discusses the sources of uncertainty in the screening-level ERA and the likelihood that any identified risks are real, as opposed to an artifact of the conservative nature of the screening-level assessment. The memo will include recommendations and strategies on how to proceed with the ecological risk assessment, if the screening-level ERA suggests further evaluation is warranted. CRA will identify types of investigations that could be used in Steps 3 through 8 of the ERA to best characterize risk and to develop appropriate site-specific remedial goals.

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